Perimeter and Area of Similar Figures
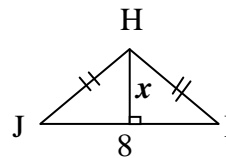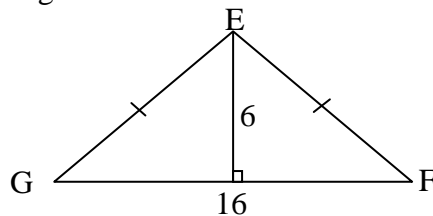
1.   The rectangles below are similar.
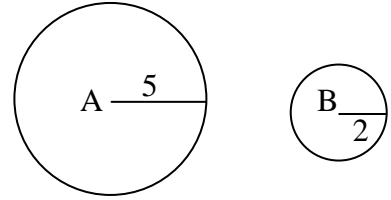

      a.   What is the similarity ratio of rectangle ABCD to rectangle MNOP? Simplify your ratio.

      b.   What is the value of x? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

      c.   What is the perimeter of each rectangle?

      d.   What is $\dfrac{\text{Perimeter of rectABCD}}{\text{Perimeter of rectMNOP}}$? Simplify your ratio.
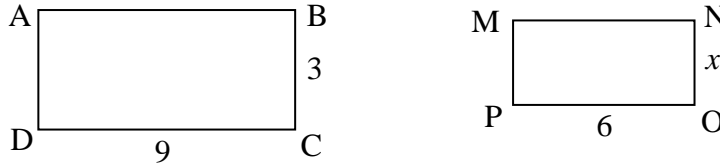
2.   The isosceles triangles below are similar.

      a.   What is the similarity ratio of triangle EFG to triangle HIJ? Simplify your ratio.

      b.   What is the value of x? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

      c.   What is the perimeter of each triangle? (Hint: use Pythagorean Theorem). Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

      d.   What is $\dfrac{\text{Perimeter of }\Delta\text{EFG}}{\text{Perimeter of }\Delta\text{HIJ}}$? Simplify your ratio.

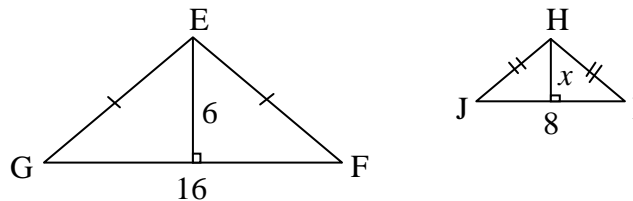# Perimeter and Area of Similar Figures (Continued)

3.   Circle A and circle B are similar.

      a.   What is the similarity ratio of circle A to circle B?

      b.   What is the circumference of each circle? Leave answers in terms of .

      c.   What is $\dfrac{\text{Circumference of circle A}}{\text{Circumference of circle B}}$? Simplify your ratio.

4.   What is the relationship between the ratio of the sides of the similar figures and the ratio of their perimeters or circumferences?

5.   These rectangles (from problem 1) are similar.

      a.   What is the similarity ratio of rectangle ABCD to rectangle MNOP?

      b.   What is the area of each rectangle?

      c.   What is $\dfrac{\text{Area of rectABCD}}{\text{Area of rectMNOP}}$? Simplify your ratio.

6.   These isosceles triangles (from problem 2) are similar.

      a.   What is the similarity ratio of triangle EFG to triangle HIJ?

      b.   What is the area of each triangle?

      c.   What is $\dfrac{\text{Area of }\Delta\text{EFG}}{\text{Area of }\Delta\text{HIJ}}$? Simplify your ratio.
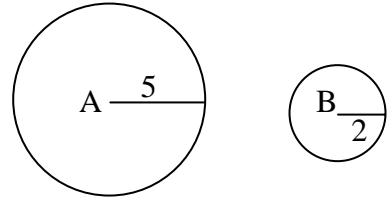
Perimeter and Area of Similar Figures (Continued)

7.   Circle A and circle B (from problem 3) are similar.

      a.   What is the similarity ratio of circle A
           to circle B?

      b.   What is the area of each circle? Leave the
           answers in terms of .

      c.   What is $\dfrac{\text{Area of circle A}}{\text{Area of circle B}}$? Simplify your ratio.

8.   What is the relationship between the ratio of the sides of the similar figures and the ratio of their areas?

9.   Fill in the blank.

> If two similar polygons or circles have lengths of corresponding sides (or radii) in the ratio of $\dfrac{a}{b}$, then their areas are in the ratio of _____.

Answers: 1.   a. $\dfrac{9}{6}$ or $\dfrac{3}{2}$ b. $\dfrac{9}{6} = \dfrac{3}{x}$, $x = 2$

            c.   P (ABCD) = 24 and P (MNOP) = 16

            d. $\dfrac{24}{16}$ or $\dfrac{3}{2}$

        2.   a. $\dfrac{16}{8}$ or $\dfrac{2}{1}$ b. $\dfrac{16}{8} = \dfrac{6}{x}$, $x = 3$

            c. $6^2 + 8^2 = (EG)^2$ $3^2 + 4^2 = (HJ)^2$

                EG = EF = 10   HJ = HI = 5

                ΔEFG : P = 10 + 10 + 16 = 36

                ΔHIJ : P = 5 + 5 + 8 = 18

            d. $\dfrac{36}{18}$ or $\dfrac{2}{1}$

        3.   a. $\dfrac{5}{2}$

            b. $\odot$A = 2(5)   = 10 $\odot$B = 2(2)   = 4

            c. $\dfrac{10\pi}{4\pi}$ or $\dfrac{5}{2}$

        4.   The ratio of the sides is the same as the ratio of the perimeters
            (circumferences).

        5.   a. $\dfrac{3}{2}$

            b.   A (ABCD) = 9(3) = 27   A (MNOP) = 6(2) = 12

            c. $\dfrac{27}{12}$ or $\dfrac{9}{4}$

        6.   a. $\dfrac{2}{1}$

            b. ΔEFG : $\dfrac{1}{2}(16)(6) = 48$ ΔHIJ : $\dfrac{1}{2}(8)(3) = 12$

            c. $\dfrac{48}{12}$ or $\dfrac{4}{1}$

        7.   a. $\dfrac{5}{2}$

            b. $\odot$A = $\pi(5)^2 = 25$ $\odot$B = $\pi(2)^2 = 4$

            c. $\dfrac{25\pi}{4\pi}$ or $\dfrac{25}{4}$

        8.   The ratio of the areas of the similar figures equals the square of
            the ratio of the sides.

9. If two similar polygons or circles have lengths of corresponding sides (or radii) in the ratio of $\dfrac{a}{b}$, then their areas are in the ratio of $\dfrac{a^2}{b^2}$ or $\left(\dfrac{a}{b}\right)^2$.